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THE SEARCH FOR HEALTH

A Report from
The National Institutes of Health
Bethesda, Maryland

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What We Learn From Wisdom Teeth

Having wisdom teeth taken out is more than just a trivial operation. When performed at the NIDR's Pain Research Facility, this relatively simple surgical procedure yields a wealth of information about the effects of surgery on the body. Scientists use the extraction of wisdom teeth as a model for acute pain because it is applicable to the acute pain that results from surgery in other parts of the body.

People undergoing wisdom teeth removal are ideal for study. Typically, they are normal, healthy patients. Prior to surgery — the removal of teeth — these people are a near-perfect model of patient anxiety. During the procedure, researchers can measure how the stress and pain caused by the surgery affects patients. Postoperatively, these patients can be given various drugs to determine which agents are most effective in reducing pain.

Researchers at the Pain Research Facility are especially interested in hormonal changes that occur in the body in response to surgical stress. Hormonal changes are governed by the pituitary gland, located in the base of the brain. This gland is often referred to as the body's master gland because it regulates such functions as growth, reproduction, and metabolism. The pituitary also has another critical function — it controls the body's ability to adapt to stress.

When the body encounters stress, from surgery for example, the pituitary gland secretes the hormone · adrenocorticotropin (ACTH). ACTH in turn stimulates the release of steroids such as cortisol that regulate our immune and metabolic responses to stress. People who are unable to secrete these hormones cannot survive. Addison's syndrome is the name of such a disorder. Even a surgical procedure as minor as the extraction of wisdom teeth could prove fatal for patients who suffer from Addison's syndrome.

While the pituitary gland secretes ACTH, it also releases another hormone in response to stress, called beta-endorphin (B-End). Beta-endorphins were recently discovered in 1975. Scientists know that the hormone is 20-100 times stronger than morphine in relieving pain. They also know that the hormone is secreted directly into the bloodstream and circulates throughout the entire body. But researchers still need to learn what the functions of beta-endorphins are in relation to stress and pain.

To answer these questions, scientists at the Pain Research Facility study the release of beta-endorphins in patients undergoing wisdom teeth removal. During the actual surgery, patients experience dramatic increases in their levels of beta-endorphins. The levels decrease following surgery and increase once again during the onset of postoperative pain.

Researchers are looking at the effects of different drugs on the release of beta-endorphins. When patients are given a placebo — in this case a pill "to control stress" during the surgical procedure — their beta-endorphin levels increase. But when they are given valium, a tranquilizer, or fentanyl, a narcotic analgesic, the release of beta-endorphins is actually blocked. These findings suggest that valium removes the patient's anxiety and perception of stress, and less stress leads to less beta-endorphins. Fentanyl, on the other hand, may act directly at the pituitary gland to inhibit the release of beta-endorphins. In addition, like valium, fentanyl also may reduce a patient's perception of stress. Patients given naloxone — a drug that reverses the effects of a narcotic — experience greater pain during surgery and have higher levels of beta-endorphins.

Investigators are also studying corticotropin (CRF), a hormone secreted by the brain that controls the pituitary gland. Corticotropin stimulates the pituitary to secrete beta-endorphins. Patients given CRF have greater beta-endorphin levels than do patients given placebo. Significantly, patients given CRF also experience less postoperative pain. These studies indicate that pituitary hormones may be critically involved in the postoperative stage, not only in the regulation of metabolism but also in the modification of postoperative pain.

Future studies at the Pain Research Facility will look at the effect of new classes of drugs on beta-endorphin release and the role of beta-endorphins in modifying pain perception. From these studies scientists will learn more about how the body responds to surgical stress and which drugs provide pain relief without the side effects of narcotics. As new avenues of research in pharmacology and physiology are broached, investigators will have definitive answers about the role of hormones in relieving pain.

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